DOCUMENT RESUME

ED 169 486 CS 004 743

AUTHOR Barnes, Carol P.
TITLE Questioning Strategies to Develop Critical Thinking Skills.
PUB DATE Jan 79
NOTE 13p.; Paper presented at the Annual Meeting of the Claremont Reading Conference (46th, Claremont, California, January 19-20, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes; *Critical Thinking; Elementary Secondary Education; Higher Education; *Questioning Techniques; *Teaching Techniques

ABSTRACT

Major research on questioning has focused on the numbers and types of questions asked by teachers, the effects of teachers' questions on students, the questioning process, questioning as used in textbooks, and the questioning pattern (what the teacher does immediately after asking a question). Teachers who have few skills to utilize questioning strategies tend to use teachers' guides which are generally of little help because they have no planned sequence of questioning and they are too cumbersome. In order to use questioning more effectively, teachers need to learn to use a basic questioning classification system. After learning such a system, teachers need to consider the questioning sequence, asking questions to establish the facts first, then asking questions to elicit convergent thinking, and finally asking questions that obtain divergent or evaluative thought. (A table of categories of questions is included as is a questioning framework providing samples for each category.) (TJ)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Carol P. Barnes

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED169486

Questioning Strategies to Develop Critical Thinking Skills

Carol P. Barnes

Questioning as an instructional technique has been recommended to teachers since Socrates used it to draw out ideas from his students. Over the years there has been a steady stream of books and monographs on the "art" of good questioning, each attesting to the belief that appropriate questioning is an important teacher characteristic. A common theme throughout this literature is that questioning is the major means by which a teacher stimulates thinking and elicits higher order mental processes such as critical judgment. Today, perhaps more than ever before, with knowledge expanding in logarithmic proportions, and "facts" changing every minute, a sound knowledge of research on questioning and assistance in applying this research seems to be a critical need of classroom teachers. Unfortunately most teachers' manuals impart little knowledge either of the research or of its possible applications. Teachers are essentially left to fend for themselves if they wish to develop critical thinking ability in their students. In response to this problem, the following paper will attempt to point out some of the major research findings on questioning and will offer a framework for teachers to utilize in developing questioning strategies to elicit higher order thinking from their students.

Research

The initial types of research on questioning focused on the numbers and types of questions asked by teachers. Consistently these studies have

CS004743

found that teachers ask a large number of questions, (1,2,3,4) the great majority of these questions call for factual answers (1,5,6,7,8) and even within classes for the gifted, more than half of the teacher's questions elicited simple recall of facts (7,8).

The next topic addressed by researchers was the effect of teachers' questions on students. Ladd and Anderson (9) and Hunkins (10) found that students exposed to analysis and evaluation questions, as opposed to primarily factual or knowledge questions, scored significantly higher on general post tests covering all levels of thinking. Moreover, those exposed to higher order questions did not suffer on recall of facts. Turner (11) found that even three and four year olds' verbal problem solving ability could be increased by carefully structuring questions to elicit this type of thinking. Rosenshine (12) in his summary of many research studies concluded that the frequency of factual questions is not related to achievement in any subjects tested. Whenever factual questions were the predominate form of teacher question, higher ability students scored significantly lower on tests of achievement. This was not true, however, for average and low ability students. One might surmise that the high ability students simply get bored and tune out! Kroot (13) studied the relationship of teacher question to students' oral response; evaluation questions led to the longest response, which certainly has implications for oral language development. Koran (14) found a positive relationship between higher order questions and analytic response; he stated that if one wants students to analyze, questions must be at this level.

One can conclude from these studies, then, that generally there seems to be a positive relationship between higher order teacher questions and

high level cognitive responses of students. Whether or not this relationship exists at all levels in all subject areas, and whether or not the relationship is curvilinear, is yet to be completely determined.

Other pertinent research deals with the questioning process, as opposed to questioning levels. For example, teachers call on students perceived as high achievers to recite or perform more frequently than on students perceived as low achievers. But not only do they call on the "lows" less (15), they are less apt to react to the low students' responses. Teachers failed to react in any way to responses from the highs in only 3% of such interactions; whereas lows received no feedback after 18% of their responses. Several studies also show that teachers allow high achievers more time to answer a question. If the high achiever hesitates, the teacher waits for him to think through the answer. High achievers also have a higher ratio of teacher-pupil interchanges at the analysis and evaluation levels (15).

Apparently questioning is even related to where a student sits: Adams and Biddle (15) in their study of grades 1,6,11 found students most likely to be asked questions or to participate in discussions were seated in a "T" shaped area with the top of the T the front of the room and the stem of the T down the middle of the room.

In addition to a student's achievement level and his place in the classroom, his sex and ethnicity appear to influence the questioning process of his teacher. Sucher (16) found that boys tried eight times more frequently than girls to respond to questions; however teachers called upon girls ten times more frequently than they called upon boys. When they did call on boys, they allowed them only 2.2 seconds to respond, whereas girls were given 7.7

seconds. This is particularly critical data in light of Lake's study (17) which showed a consistent relationship between wait time and higher level cognitive processes. The same kinds of data are available with regard to ethnicity: minority students are generally given fewer opportunities to answer the teachers' questions and less time to do so. One must surely pity the minority boy!

At the college level the situation is no better. Barnes (18) found that 83% of all questions asked in undergraduate classrooms are at the factual level, that professors have a strong tendency to answer their own questions--not even allowing three seconds for a student response, and that there is little difference in questioning levels and patterns across course level, subject areas, or institutions. Yet higher level professor questions appear to be positively correlated with critical thinking, students' attitudes toward the subject, and with the overall cognitive level of students (18,19).

Other researchers, realizing the stranglehold that text books have on curriculum, and on teachers have examined the question in texts. In one of the most recent studies, Habecker (20) found that in 144 lesson plans from four major basal reader publishers, none had a planned distribution of questions over the various cognitive levels; application questions were least emphasized, memory and recall were most emphasized. When one observes how texts are viewed as gospel edicts and how teachers are being increasingly required to use the basals and to go "back to the basics" (whatever those are), the potential impact of these data become obvious.

The last major area of research on questioning deals with questioning pattern- or- "What does the teacher do immediately before and after his question?" At the college level he lectures, asks a low level question

and answers the question (18). In earlier grades, the pattern generally is low level question, followed either by a positive student response or by another teacher question (21). Taba, in her studies (22,23,24) of questioning sequence and the effect of this on the thought levels of children, urged that teachers address their questions to the objectives they have for the classes' thinking and sequence these questions to elicit the types of thinking desired. She found that when teachers attempted to raise the level of thought too early in a discussion, the children's ability to maintain thinking at that level was soon exhausted and rapidly deteriorated to a lower level. She suggested first focusing on observed facts, categories and concepts, then extending this thinking to a number of children, and finally lifting the level to more complex modes of thinking (generalizations, inferences, explanations, etc.) In her research, this procedure resulted in a gradual movement of the majority of the students toward higher levels of thinking.

Utilizing the Research

It appears, then, that proper questioning strategies are a vital tool for teachers to elicit critical thinking from their students. Unfortunately, very few teachers have the skills needed to use these strategies. In absence of this knowledge, they rely on teachers' guides to direct their lessons, and in the area of reading, particularly, these are generally of little help. First, as Habecker's study showed, (20), the guides have no planned sequence of questioning; and second, they are so cumbersome that teachers must wade through pages of seemingly irrelevant material to find anything of help. In analyzing how a group of student teachers used the teachers' guides of basal readers, I found that most turned first to the

section immediately preceding the story and introduced new vocabulary words, then asked the factual comprehension questions given with each section of reading, and concluded with a related skills or workbook assignment. If any suggestions were given to develop critical thinking (and most often they weren't), the teachers never saw them!

Obviously teachers need practical help--not admonition to wade through more pages of the manuals. I have found two simple and workable ways to assist. One, teachers can be taught to use a basic questioning classification system. Sanders (based on Bloom) seems to be unnecessarily complex; easier to use is the Aschner and Gallagher system (based on Guilford's structure of the intellect) (25). This system groups questions into one of four categories: (Insert Table 1)

TABLE 1

CATEGORIES OF QUESTIONS

COGNITIVE MEMORY	CONVERGENT	DIVERGENT	EVALUATIVE
Examples of Behavior Elicited *			
Recall	Explain	Infer	Judge
Identify-Observe	Express in another mode	Reconstruct	Value
Give Yes or No Response	State Relationships	Predict	Defend
Name	Compare and Contrast	Hypothesize	Justify a Choice or Solution
Designate	Solve a Problem	Solve a Problem	
Define		Invent, Design	

*No hierarchy is implied

Table 2

Questioning Framework

1. Cognitive Memory - (Establish the "facts.")

   Who was _____?

   What did _____say, do, go?

   Where was _____?

2. Convergent - (Help student interpret, analyze and integrate idea)

   Can you retell the story in your own words?

   Can you act out the story as the author told it?

   Can you compare the story (book) to _____?

3. Divergent - (Develop creative ideas; elicit the "unexpected" thoughts; help student solve a problem)

   Can you retell the story with a change?

   (e.g.) _____if the villain had been friendly

   _____if there had been only 2 little pigs

   _____(from the point of view of the wolf)

   Can you act out the story as it might have happened if the _____ had been (done) _____?

   Can you imitate the voice of the _____?

   What do you suppose would have happened if _____?

   How do you think _____looked after _____?

4. Evaluative - (Develop judgment of good, bad, right, wrong; help establish standards)

   Do you feel it was all right for _____to _____?

   Why or why not" (Be sure to ask this; otherwise you may not actually be developing evaluative thinking!)

   Do you feel sorry for _____? Why or why not?

   Should _____feel sorry for what he/she did? Why or why not?

   Would you have acted as _____did? Why or why not?

Within ten minutes teachers can master this classification system and are able to analyze the kinds of questions they ask or need to ask. Their next task is to consider questioning sequence. Using Taba's suggestions, they can utilize the examples in Table 2 as a guide. (Insert Table 2) First teachers establish the facts (cognitive memory) and ensure that the majority of children understand them. This is a critical step that is often overlooked by a teacher whose goal is to develop critical thinking. He must keep in mind that the student "can't think about nothing!" Once it is clear that most students know the facts, teachers can then elicit convergent thinking and extend this type of thinking to many students. Finally they can obtain divergent or evaluative thought. The first two steps in the sequence seem crucial; for example, if a student can't relate the specific facts about a story, he can't be expected to retell the story in his own words. If he can't retell the story in his own words, he probably can't retell it from the point of view of the villain or make judgments about it. Once cognitive memory and convergent thinking are obtained, either divergent or evaluative thinking may be pursued.

When both the classification system and the sequence frame work are learned, the teacher is freed from total reliance on the published manuals. An added advantage of this system is that it is transferrable: during an individual reading conference the teacher can use it to question the student about his reading; during social studies it can be used to guide discussion, etc.

Summary

Research results continue to support the notion that effective questioning is one of the most important teaching skills; it is, in fact, the

the main device for eliciting critical thinking from students. Unfortunately publishers gravely neglect this area, and teachers, K-12 or college, are forced to assist themselves. Good questioning takes skill and planning; it doesn't just happen. But once the teacher is able to use a workable questioning system, effective questioning is quite a natural process.

References

(1) Stevens, R. The question as a measure of efficiency in instruction: A critical study of classroom practice. Teachers College Contributions to Education, 1912, 48 (whole issue).

(2) Floyd, W. D. An analysis of the oral questioning activity in selected Colorado primary classrooms. (Doctoral dissertation, Colorado State College, 1960).

(3) Moyer, J. R. An exploratory study of questioning in the instructional processes in selected elementary schools (Doctoral dissertation, Columbia University, 1965).

(4) Schreiber, J. E. Teachers' question-asking techniques in social studies. (Doctoral dissertation, University of Iowa, 1967).

(5) Haynes, H. C. The relation of teacher intelligence, teacher experience, and type of school to types of questions. Unpublished doctoral dissertation, George Peabody College for Teachers, 1935.

(6) Berliner, D. C. Microteaching and the technical skills approach to teacher training. Stanford, CA: Technical Report No. 8, Stanford Center for Research and Development in Teaching, 1969.

(7) Gall, M. D. Use of questions in teaching. Review of Educational Research, December, 1970, 40, 707-21.

(8) Gall, M. D. The effects of teacher use of questioning techniques on student achievement and attitudes. Vol. I, Final Report. Teacher Education Publication Series. Far West Lab for Educational Research and Development, San Francisco, CA 1976.

(9) Ladd, G. T., and Anderson, H. O. Determining the level of inquiry in teachers' questions. Journal of Research in Science Teaching, 1970, 7 (4), 395-400.

(10) Hunkins, F. P. Analysis and evaluation questioning: Their effect upon critical thinking: Social studies inference test. Educational Leadership, 1970, 27, 699-705.

(11) Turner, P. and Durrett, M.E., Teacher Level of Questioning and Problem Solving in Young Children. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C., 1975.

(12) Rosenshine, B. Evaluation of classroom instruction. Review of Educational Research, 1970, 40 (2), 279-300.

(13) Kroot, N. E. An analysis of the responses of four, six and eight-year old children to four kinds of questions. (Doctoral dissertation, Indiana University, 1976).

(14) Koran, J. J. and Koran, M. L. Validating a teacher behavior by student performance. Florida State Department of Education Report No. FSDE-730-063. Tallahassee, Fla. 1973.

(15) Los Angeles Unified School District, Title IV-C, Effects of teacher expectation on student learning project. The Reflector, Los Angeles Unified School District Office of Instruction. Vol. 7, #4, December, 1977.

(16) Sucher, F. cited in McCormack, P. Boys seem victims of discrimination. Daily News Tribune, December 9, 1976.

(17) Lake, J. The influence of wait-time on the verbal dimension of student inquiry behavior. (Doctoral dissertation, Rutgers University, 1973).

(18) Barnes, C. P. A descriptive study of the questioning behavior of college instructors. (Doctoral dissertation, Claremont Graduate School, 1975)

(19) Smith, D. Process-outcome study of instruction in higher education. (Doctoral dissertation, Claremont Graduate School, 1975).

(20) Habecker, J. E. An analysis of reading questions in basal reading series based on Bloom's Taxonomy. (Doctoral dissertation, University of Pennsylvania, 1976).

(21) Guszak, F. J. Questioning strategies of elementary teachers in relation to comprehension. Paper presented at meeting of International Reading Association Conference, Boston, 1968. (ED 023,545).

(22) Taba, H. R. Teaching strategies for cognitive growth. In E. M. Bower & W. C. Hollister (Eds.) Behavioral science frontiers in education. New York: Wiley, 1967.

(23) Taba, H., Levine, S., and Elzey, F. F. Thinking in elementary school children (U.S. Office of Education Cooperative Research Project No. 1574(. San Francisco: San Francisco State College, 1964.

(24) Taba, H. Teaching strategies and cognitive function in elementary school children (U.S. Office of Education Cooperative Research Project No. 2404). San Francisco: San Francisco State College, 1966.

(25) Aschner, M. J. & Gallagher, J. Aschner-Gallagher system for classifying thought-processes in the context of classroom verbal interaction in Simon, A., and Boyer, E. G. (Eds.). Mirrors for behavior: An anthology of classroom observation instruments. Philadelphia: Research for Better Schools, 1970.